

**Movements of Juvenile Chinook Salmon at
Entrances to the Delta Cross Channel and
Georgiana Slough and Reach Survival for the
Sacramento River and Delta**

Derrek M Faber

Public Comments

No public comments were received for this proposal.

Initial Selection Panel Review

Proposal Title

#0223: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Reach Survival for the Sacramento River and Delta

Funding:

Do not fund

Initial Selection Panel (Primary) Review

Topic Areas

- Environmental Influences On Key Species And Ecosystems
- Direct And Indirect Effects Of Diversions On At-risk Species
- Implications Of Future Change On Regional Hydrology, Water Operations, And Environmental Processes
- Assessment And Monitoring
- Salmonid-related Projects

Please describe the relevance and strategic importance of this proposal in the context of this PSP. How does the proposal address the topic areas identified above? What are the broader CALFED Goals this proposal may meet that are not accounted for in these specific topic areas?

This proposal has high relevance to key questions concerning salmon smolt survival in the Delta. This work builds on previous work by others and can confirm and extend previous results. The results could be critical to future changes in water conveyance through the Delta. This proposal ranks high in strategic importance. I have concern however that it does not appear that the USBR has been contacted about their interest and ability to allow DCC gate operations to be modified for experimental purposes.

The budgets of proposals submitted in response to this PSP are larger, on average, than those submitted to CALFED in previous years. The Science Program is committed to getting as

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Initial Selection Panel Review

much science per dollar as is reasonably possible. With this commitment in mind, can the proposed budget be streamlined? If so, please recommend and clearly justify a new budget total in the space provided.

The budget on this proposal does not make any sense. The proposal is for three years, the first of which is purchasing of the hydrophone equipment and trial placement in the Estuary. The actual work with Salmon smolts occurs in years 2 and 3. However the \$679,799 budget is only for year one work. Some of these year one budget numbers are not well documented. There is no budget for any of the year 2 or 3 tasks. This is not explained

Evaluation Summary And Rating.

Provide a brief explanation of your summary rating and any additional comments you feel are pertinent.

While much of this proposal appears very well developed and a good match for Calfed related problems and information needs, and the technology is apparently of good quality for this purpose, the lack of a budget for years 2 and 3 are a near fatal flaw. I would not support almost \$700,000 being devoted to testing out new technology in the estuary under this Science PSP. However, this work may be suitable for funding in its entirety by the Calfed Conveyance Program.

Selection Panel (Discussion) Review

fund this amount: \$0

note:

do not fund

The Panel acknowledged the importance of the research objectives presented here. The proposal was detailed and the acoustic monitoring system well-designed from a technical standpoint. However, the budget covered only activities through Year 1 of a 3 year overall proposal. Thus, it is not clear what products will be delivered as a result of funding the proposal at this time. Also, there is no coupling of this

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Initial Selection Panel Review

sonic monitoring technology with the hydrodynamic complexities of the system (i.e., operations flow and salinity) and it does not appear that proponents have coordinated with those who could help interpret and integrate the impacts of these processes. In addition, the proposal did not clearly identify whether the equipment and the analyses resulting from these data would be publicly available to the extent required by state law and CBDA policy.

Panel Ranking: Do not fund

Technical Synthesis Panel Review

Proposal Title

#0223: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Reach Survival for the Sacramento River and Delta

Final Panel Rating
above average

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

The goal of this study is to use acoustic telemetry to track the movement and survival of two of the four distinct runs of Chinook juveniles in the Sacramento River. More specifically, this project will track the movement of yearling and subyearlings, estimate passage proportions by three routes, and estimate survival for multiple river reaches. Multiple hypotheses are posed to be tested to both confirm/refute earlier findings and to provide new information related to the effects of water operations and tidal conditions on reach-specific survival of upper Sacramento River salmonids. The use of telemetry technology will allow for survival estimates to be made at appropriate spatial and temporal scales in order to better establish reliable cause and affect relationships.

Additional Comments:

Reviewers described the project as good, very good, and excellent. Reviewers thought the proposed study sought to test interesting hypotheses, apply new technology, employ a highly qualified research team, and could substantially elevate current understanding about juvenile Chinook out-migration. However, more information regarding coordination of proposed

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Technical Synthesis Panel Review

activities (e.g. how tagged fish releases will be coordinated with gate operations and other agencies) and budget specifics were needed. The methods varied in detail, with some sections extremely detailed and others vague. The time frame for each year's work was also somewhat vague. Dissemination of the results is vague and not substantial as currently described. The focus of the study seems to be somewhat technology-focused rather than on the system on which it will be deployed, warranting a further explanation of direct benefit to at-risk fish stocks of Chinook in the Sacramento region.

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Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

Movements of juvenile Chinook salmon at entrances to the Delta Cross Channel and Georgian Slough and reach survival for the Sacramento River and Delta

The reviewers and panel recognized that while the study was not science based, there was high technical, scientific and management value in this proposal. While expensive, the advanced technology will provide valuable, high resolution data on fish movement and behavior important in many aspects of fish and water management. The panel expressed some concern

Technical Synthesis Panel Review

regarding the apparent low level, up-front coordination with local fish and water managers. Integration of new technologies within areas with existing monitoring systems often requires close coordination between cooperators, and can be problematic. The details of the proposed budget were also considered unclear. With these considerations, the panel ranked the proposal as above average.

Final Ranking: Above Average

Technical Review #1

proposal title: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Reach Survival for the Sacramento River and Delta

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	The project goals, objectives, and hypotheses are clearly stated and consistent. The application of impressive new acoustic telemetry system may challenge current understanding about Chinook emigration near the Delta Cross Channel (DCC), Georgiana Slough (GS), and lower Sacramento River. Smolt losses due to Sacramento River diversions and delta water operations are chronic fishery management issues that would certainly benefit from additional study. Fall run hatchery fish may be appropriate surrogates but the emigration timing of more sensitive populations should be considered.
Rating	very good

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	The literature review makes a case for additional DCC and GS study but the proposal lacks detail about water operations and how the release strategy would answer specific operational questions. However, the telemetry system's power to reveal detailed patterns of emigration behavior and improve survival estimates
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Technical Review #1

	justifies the investigation.
Rating	very good

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	The accurate positioning capabilities of JSATS will encourage formation of new hypotheses about juvenile Chinook movement in the delta. The emphasis on fish movement near DCC and GS is acknowledged in the proposal. Information to support the study of other reaches is lacking. Testing hypotheses 9-12 seems reasonable but would require unidentified efforts of other researchers to provide environmental data (hydraulics and water quality).
Rating	excellent

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	The documentation of technical feasibility is this proposal's greatest strength. The JSATS has been tested extensively and used successfully in the Columbia River basin. The first year of study would be dedicated to comprehensive testing of acoustic array performance. There is little doubt the study will generate detailed behavioral data and precise survival estimates. I use radio and acoustic telemetry systems, from a manufacturer listed in the proposal, in my own research and I am impressed with the JSATS' capabilities.
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Technical Review #1

Rating	excellent
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Monitoring

If applicable, is monitoring appropriately designed (pre–post comparisons; treatment–control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	Not applicable.
Rating	not applicable

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	<p>Reports and likely peer reviewed journal articles will enhance knowledge about DCC, GS and should suggest ways to improve survival in the study reaches. The Tag Viz data visualization program is an interesting product that may be an effective way to illustrate trends to managers and other researchers. As I mentioned above, the full potential of this effort relies on unspecified work by other organizations to provide hydraulic and water quality data. How this tagging study will integrate these other efforts needs further explanation. The CALFED science program could benefit from development of a coordinated interagency biotelemetry monitoring system in the Delta and Central Valley. Will the Fish and Wildlife Service retain the hydrophones and associated equipment when the study is completed? Is the system commercially available? Could this application of JSATS serve as a model for investigations by other groups in the Central Valley?</p>
Rating	good

Additional Comments

Comments	Telemetry studies of juvenile salmonids are typically constrained by tag size, operational life, signal encoding, and detection efficiency. The JSATS 0.65 g transmitter is a significant acoustic telemetry advancement. While other manufacturers are producing new systems that have performance capabilities similar to JSATS (CDMA encoded tags, autonomous wireless hydrophones, 3D positioning, 200 + m detection ranges) none are as well suited to the study of small juvenile Chinook. The array configuration and optimization procedures are also impressive. The project team's experience and capabilities can greatly elevate the sophistication of smolt research in the Delta.
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Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	The project team is exceptionally qualified to conduct the study. The applicants developed the technology and have extensive experience investigating juvenile salmonid behavior, fish passage, and survival in the Columbia River basin. The lead scientists are well known professionals and have published extensively in peer-reviewed journals.
Rating	excellent

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	I have some questions and reservations about the budget. The version I am reviewing does not appear to be complete. The study is slated for 3 years yet the budget forms list expenditures only for year 1 (tasks 1-7). Approximately half of the total \$676,799 request
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Technical Review #1

	is for tags, drogues, and hydrophones but the total number of each is not specified. Will tag costs be recurring? Are the applicants requesting funding for the full study or only the pilot and coordination phase? If the answer to the later question is yes, I would hesitate to invest \$400,000 in infrastructure and planning without the guarantee of future funding. It seems that costs for the full 3 years could easily exceed 1 million dollars. That level of research funding should be justified by continued use of the purchased equipment for additional years of study. If hydraulic and water quality monitoring efforts in the study reaches are insufficient to support the telemetry research, will additional expenditures (e.g., ADCP) be required?
Rating	poor

Overall

Provide a brief explanation of your summary rating.

Comments	The proposed study tests interesting hypotheses, applies exciting new technology, employs a highly qualified research team, and could substantially elevate current understanding about juvenile Chinook outmigration in the Delta. The proposal could benefit from more information about the study reaches beyond DCC and GS, how tagged fish releases will be coordinated with DCC gate operations, how the project will coordinate with water quality and hydraulic investigations outside the scope of the proposed project, and a more complete budget with costs for the full 36 months.
Rating	very good

Technical Review #2

proposal title: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Reach Survival for the Sacramento River and Delta

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	The study's goals are to use acoustic telemetry to track juvenile Chinook salmon movements at the entrance to two channels/sloughs on the Sacramento R. and to evaluate survival in five Delta and river reaches. These goals were developed to test 12 hypotheses, including some that had previously been tested. The hypotheses are reasonable, if simple, and in the case of #'s 11 and 12, perhaps pre-destined for rejection.
Rating	very good

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	The justification for the first goal is concise, and based largely on the results of previous studies in the Sacramento River and Delta. The justification for the second goal is not as strong, though the reviewer assumed that this justification may have been presented in prior proposals testing the hypotheses that this proposal wants to re-verify.
Rating	

Technical Review #2

	very good
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Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	The use of the JSATS system appears to old promise for accurate measurement of juvenile salmon locations. The investigators seem to have some issue with HTI (an acoustic tag manufacturer), as they continuously compare their products to the HTI ones, and point out the supposed inferiority of the HTI products. The data analyses are well thought out, and it was gratifying to see the inclusion of estimate detection ranges and estimated standard errors.
Rating	excellent

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	Though it would have been nice to see more of an evaluation of the functionality of the JSATS system from the first full field deployment on the Columbia R., it appears as if this technology will prove suitable for use in the Sacramento system and will allow for the successful completion of the project.
Rating	excellent

Technical Review #2

Monitoring

If applicable, is monitoring appropriately designed (pre–post comparisons; treatment–control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	N/A
Rating	not applicable

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	In addition to the expected annual and final reports and presentations, the investigators should be commended for proposing to submit their results for publication in a peer-reviewed journals.
Rating	excellent

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	The authors have an excellent track record and having worked with a similar system on the Columbia R., have valuable practical experience in implementing such a large-scale telemetry study.
Rating	very good

Technical Review #2

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	The budget actually appears somewhat low for work of this nature, but perhaps that is because a large proportion of the budget is not used up by salaries for investigators, as often is the case with CalFed proposals.
Rating	good

Overall

Provide a brief explanation of your summary rating.

Comments	I would rate this as one of the most comprehensive CalFed proposals that I have seen for some time. The project team is solid, had a proven track record, and are using an innovative approach to answering questions that have been asked for a long time. I definitely recommend this proposal for funding in this round.
Rating	excellent

Technical Review #3

proposal title: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Reach Survival for the Sacramento River and Delta

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	Yes, the goals and hypotheses are clearly stated. The study as described adheres to them well and addresses the hypotheses as stated. Yes, the idea is timely since the conservation and management of the fish species and life history stage addressed is of current concern. The study appears important from the perspective of developing a new assessment tool. It is somewhat less clear if it is actually important to the fish stocks being explicitly studied.
Rating	very good

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	Yes and No. The study does derive its biological aspects from previous studies in the Delta Cross Channel area and would enhance the information gained in the previous studies on both migratory path and survival in these areas. The proposal does a weaker job of describing the importance of doing this study in this particular location (i.e. the Sacramento) than it does in justifying the use of a new technology. It is clear to me that if this approach works, as seems
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Technical Review #3

	likely, it will provide an important and relevant tool for fisheries research. The justification of why it is being deployed in this area is weaker, particularly since there does not seem to have been substantial local (i.e. CA) input into the development of the project.
Rating	good

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	Yes, the approach is well designed and results have the potential to be strong and supportable. Yes, the methods employed do address the hypotheses as stated. The study has the potential to add to the information known about smolt movements in the area studied quite significantly. Yes, I think that the information generated will be of use to local water and fisheries managers.
Rating	very good

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	The proposal could be better documented in that much of the methodology depends on results from in-house studies on the effectiveness and precision of the telemetry system. A more detailed presentation of that material would have added credence. I think that the project is certainly feasible for the authors. My only concern is that the project does not document support from local agencies/concerns. I presume that the
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Technical Review #3

	participation of local USFWS personnel (Bellmer) implies this, but it would still be nice to have some participation from state agencies etc. This project hinges on the cooperation of a number of agencies and will fail without their support. While I suspect their support is likely, it seems imprudent not to provide documentation of that support.
Rating	good

Monitoring

If applicable, is monitoring appropriately designed (pre–post comparisons; treatment–control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	yes, the monitoring plan for the efficiency of the equipment is good. There are several levels of monitoring that should provide substantial data evaluating the effectiveness of the in-river systems. Yes, there are substantial descriptions of the analysis and the personnel involved should be sufficient.
Rating	very good

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	Products from this project are not explicitly described. Reports to the funding agency will be generated, but there is little mention of larger distribution of results. There is no stated interpretive outcome.
Rating	fair

Technical Review #3

Additional Comments

Comments	See below under Overall
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Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	yes, these authors have a strong record of publications in this field and have substantial experience in this technology and research area.
Rating	very good

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	The budget is likely reasonable, but I was unsure of the breakdown of the cost for the hydrophones and tags/drogues which are by far the largest components of the costs. Labor is substantial, but probably legitimate.
Rating	good

Overall

Provide a brief explanation of your summary rating.

Comments	I have three primary concerns about this project. 1) The methods in some sections are extremely detailed (e.g. tag implantation, array deployment, # dead fish floaters), but are very vague in others. I do not understand why this study has not focussed on particular salmon runs or discuss water regulation/management aspects explicitly in their protocols. The time frame for each year's work is also somewhat vague and makes it difficult to interpret
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Technical Review #3

	<p>some of the budgetary items 2) Despite this inclusion of USFWS personnel, this proposal reads like it was written without substantial input from local managers who are intimately familiar with the system. This is an ambitious project that requires local input and yet any preliminary work in this area which may have been done is not outlined in the proposal. 3) Dissemination of the information gathered is not addressed much beyond stating that data will be held by BMI and that access, while allowed for the granting agency, will be restricted. Addressing these seemingly simple issues would make this proposal extremely attractive. I think that this is a potentially important technology that is being developed which could significantly benefit fisheries managers, but the focus of the proposal seems almost entirely on the technology and not as much on the system into which it would be deployed. In principle, I have no problem with a project to develop and enhance a system such as this, but I would prefer to have a better explanation of how it will also directly benefit specific fish stocks in the area. I am not sure that this project would fail in that area, just that it is not clear from their proposal. Overall, this project has very attractive points and some weak aspects which result in a "good" overall rating in my mind.</p>
Rating	good